ENDOCRINOLOGY EMERGENCIES:

HYPERCALCEMIA AND

HYPOCALCEMIA

W.E.D. 21 SEPTEMBER 1999

HYPERCALCEMIA SIGNS AND SYMPTOMS

- GI - nausea, vomiting, constipation, anorexia
- RENAL - polydypsia, polyuria, renal failure, stones
- CNS - hyporeflexia, myopathy, stupor, psychosis
- CARDIAC - short QT, digitalis sensitivity, hypertension

DISEASES ASSOCIATED WITH HYPERCALCEMIA

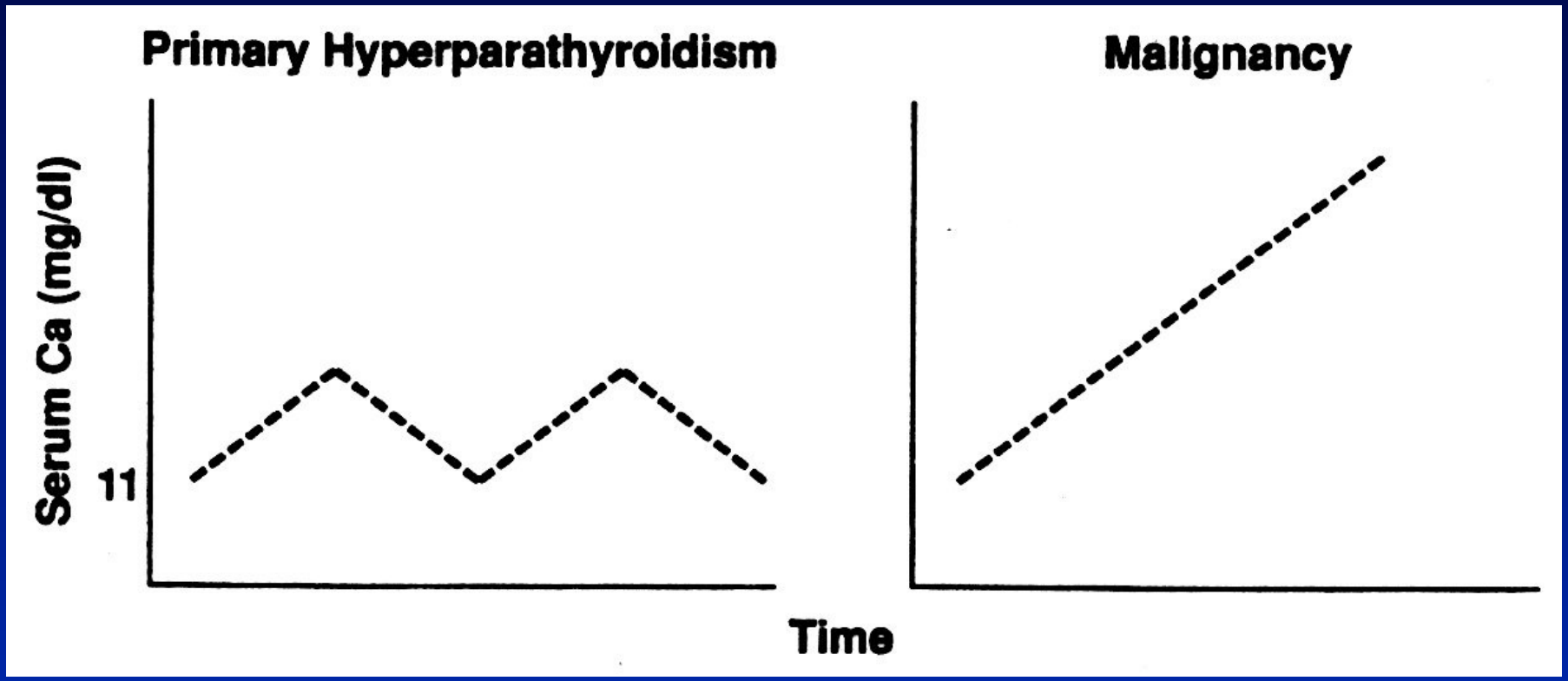
Primary	Hyperparathyroidism	111 (54%)
Malignant Disease		72 (35%)
Unknown		12 (6%)
Other Causes		12 (6%)
TOTAL		207 (100%)

ASYMPTOMATIC HYPERPARATHYROIDISM NIH CONSENSUS CONFERENCE RECOMMENDATIONS (Oct 29-31, 1990)

- INDICATIONS FOR MEDICAL MONITORING
  - mild hypercalcemia
  - no episodes of life-threatening hypercalcemia
  - normal renal and bone status
- INDICATIONS FOR SURGERY
  - markedly elevated S Ca (1.0-1.6 mg/dl > ULN)
  - previous episode of life-threatening hypercalcemia
  - reduced creatinine clearance (>30%)
  - kidney stones present
  - increased U Ca excretion (>400 mg/d)
  - reduced bone mass (>2 SD below controls - radius)
- OTHER INDICATIONS FOR SURGERY
  - patient requests surgery
  - F/U can not be assured
  - young (<50 yo)

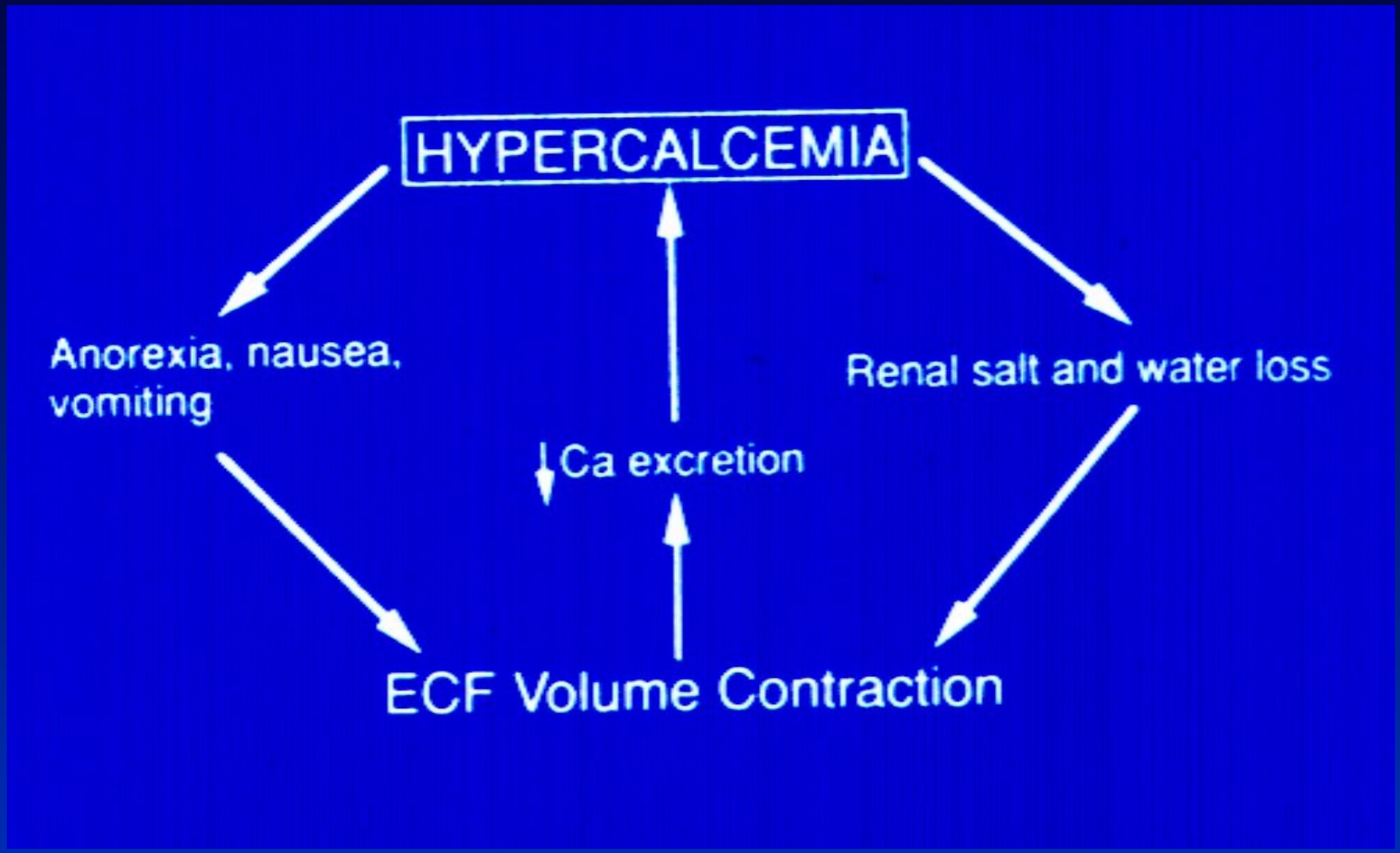
MAH vs. HPT CLINICAL PEARLS

- PTH concentrations are usually elevated in HPT, suppressed in MAH. Ectopic secretion of PTH is very rare.
- Remember, patients with one malignancy are more likely to have another.
- In MAH, the malignancy is rarely occult. The hypercalcemia is often a near terminal event.
- Recent onset of hypercalcemia or progressive rise = MAH; a long duration of mild hypercalcemia most likely HPT.


Primary Hyperparathyroidism
Malignancy
Serum Ca (mg/dl)
11
Time

TREATMENT OF HYPERCALCEMIA GENERAL PRINCIPLES

- Virtually all patients with severe and symptomatic hypercalcemia will be volume depleted. Volume replacement should be started first.
- Acute therapy of hypercalcemia is usually effective. Long term therapy is more problematic.


HYPERCALCEMIA
Anorexia, nausea, vomiting
Renal salt and water loss
↓Ca excretion
ECF Volume Contraction

TREATMENTS FOR YPERCALCEMIA

GENERAL

Vol. Expansion (saline)
Diuresis (Lasix)
Mobilization
Restrict PO Calcium
Dialysis

SPECIFIC

I.V. Palmidrona
I.V. Etidronate
Calcitonin
Gallium nitrate
Plicamycin
Glucocorticoids
Phosphate
Indomethacin
Antitumor Therapy

PALMIDRONATE

- A second generation bisphosphonate; has a greater calcium-lowering effect and a longer duration of action than other agents. Effective in >95% of patients.
- Dose:60-90 mg IV infusion over 4-24 hrs. Normalizes calcium 30% @ 30mg; 61% @ 60 mg; 100% @ 90 mg w/in 4 days
- Duration: 2-4 weeks
- Calcitonin may be added for a more rapid effect

PALMIDRONATE #2

- Generally well tolerated; main side effects are fever and gastrointestinal.
- Other second generation bisphosphonates

Clodronate	Tiludronate
Alendronate	Ibandronate
Risedronate	Zoledronate

MANEFESTATIONS OF HYPOCALCEMIA

- Neurologic
  - peripheral irritability (tetany)
    +Chvostek's and Trousseau's signs
  - central irritability (seizures)
  - intracranial calcifications (basal ganglia)
  - papilledema
  - mental changes
- Cataracts
- Abnormal Dentition
- Cardiovascular
  - prolonged Q-T interval
  - CHF, digitalis resistance

TROUSSEAU'S SIGN

TREATMENT OF HYPOCALCEMIA

- CHRONIC HYPOCALCEMIA
  - start supplemental oral calcium and a vitamin D preparation
  - maintain serum calcium in the low normal range because of the risk of hypercalciuria and nephrolithiasis

- ACUTE HYPOCALCEMIA
  - IV calcium infusion (calcium gluconate)
  - start po calcium and vitamin D

ORAL CALCIUM PREPARATIONS

CALCIUM SALT	ELEMENTAL CALCIUM
Ca glubionate	6%
Ca gluconate	9%
Ca lactate	11%
Ca citrate	21%
Ca acetate	25%
Ca phosphate	39%
Ca carbonate	40%

COMPARISON OF VARIOUS VITAMIN D PREPARATIONS

	Ergocalciferol (Vitamin D)	Calderol (25 OH D)	Rocaltrol ($1_2$25 (OH) D)
Physiological dose (mcg/d)	10	5	0.5
Pharmacologic dose (mcg/d)	1200	50	1
Maximal effect (days)	30	15	3